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EFFECTS OF MEDIYOGA AMONG PATIENTS WITH PAROXYSMAL ATRIAL FIBRILLATION

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No man is an island,
Entire of itself,
Every man is a piece of the continent,
A part of the main.
If a clod be washed away by the sea,
Europe is the less.
As well as if a promontory were.
As well as if a manor of thy friend's
Or of thine own were:
Any man's death diminishes me,
Because I am involved in mankind,
And therefore never send to know for whom the bell tolls;
It tolls for thee.

John Donne 1572-1631

To my one and only, my soulmate, my love and my husband, Mårten

ABSTRACT

Introduction

Patients with paroxysmal atrial fibrillation often experience impaired health-related quality of life. Standard treatment is not always sufficient and changes in life-style habits are suggested as a complement. Also, studies have suggested differences in gender where women have extended side effects of rhythm medications, more symptoms and estimate lower health-related quality of life than men. Yoga has been shown to increase health-related quality of life and decrease blood pressure, heart rate and cardiac biomarkers. The overall aim of this thesis was to study the effects of MediYoga among patients with paroxysmal atrial fibrillation. In addition, to evaluate perceptions and experiences of MediYoga as well as gender differences.

Methods and results

Paper I: This is a randomized, controlled pilot study in which 80 patients were randomized to MediYoga, *n*=40, or a control group, *n*=40 at an University Hospital, in Stockholm, Sweden. The yoga groups had been performing MediYoga for one hour/week over a 12 weeks period. Assessments as health-related quality of life questionnaires (i.e. SF-36, EQ-5D Visual Analogue Scale), blood pressure and heart rate were collected at baseline and at the end of study. The results showed an improvement of health-related quality of life in the yoga group. Blood pressure and heart rate also decreased in the yoga group.

Paper II: In this prospective randomized study at an University Hospital, Stockholm, Sweden, with stratification in gender, 132 patients, with symptomatic PAF, were randomized to yoga (*n*=44), relaxation (*n*=44) and a control group (*n*=44). The yoga groups had been performing MediYoga for one hour/week over a 12 weeks period. Assessments as health-related quality of life questionnaires (i.e. SF-36, ASTA), blood pressure, heart rate as well as NT-proBNP were collected at baseline and at the end of the study. The results showed no differences in the ASTA and SF-36 between the groups. However, improvements were seen in health-related quality of life, SF-36, with-in the MediYoga group. Both systolic and diastolic blood pressure decreased in the MediYoga group compared to the control group but there was no difference compared to the relaxation group. There were no differences in heart rate and NT-proBNP between or with-in the groups after 12 weeks.

Paper III: A study with a qualitative design was conducted using individual semi-structured interviews. The study included 12 participants (7 men and 5 women) who had participated in the yoga group in Paper II. The data were analysed using qualitative content analysis with an inductive method and a manifest approach. Three categories were found in the analysis; “A time for a sense of existence and presence”, “A way of gaining well-being and increased consciousness” and “Access to a tool to gain willpower and relieve symptoms”.

Paper IV: A comparative design examining gender differences among those who had performed MediYoga (women *n*=37, men *n*=34). The yoga groups had been performing MediYoga for one hour/week over a 12 weeks period. Data (i.e health-related quality of life [SF-36], blood pressure and heart rate) were collected at baseline and the end of the study. There were no differences between the women or men group in SF-36 at end of study, however, there was improvement with-in the women group in the subscales vitality, social function, mental health and the domain mental component summary score. In the male group, there were improvement with-in the subscales role-physical, bodily pain, general health, vitality, social function, role-emotion and the domain mental component summary score (SF-36). There were no differences between the groups in systolic and diastolic blood pressure as well as heart rate at the end of the study. With-in the women group differences were observed in systolic and diastolic blood pressure, however, no difference was seen in heart rate. With-in the men group improvement were seen in diastolic blood pressure but no differences were seen in systolic blood pressure or heart rate.

Conclusions

MediYoga improves health-related quality of life as well as blood pressure among patients with PAF. Also, both genders report benefits, and patients describe MediYoga as an accessible tool with which to handle emotions and symptoms. MediYoga may be a part of a self-management program, as a complementary treatment, among patients with PAF.

LIST OF SCIENTIFIC PAPERS

I. Nilsson M, Rydell Karlsson M, Medin J, Frykman V. Effects of yoga in patients with paroxysmal atrial fibrillation - a randomized controlled study. *European Journal of Cardiovascular Nursing : Journal of the Working Group on Cardiovascular Nursing of the European Society of Cardiology. 2017 Jan;16(1):57-63.*

II. Wahlström M. Rosenqvist M. Medin J, Walfridsson U, Rydell Karlsson M. MediYoga as a part of a self-management program among patients with Paroxysmal Atrial Fibrillation.
Submitted

III. Wahlstrom M, Rydell Karlsson M, Medin J. Perceptions and experiences of MediYoga among patients with paroxysmal atrial fibrillation - an interview study. *December 2018. Complementary Therapies in Medicine 4. DOI: 10.1016/j.ctim.2018.09.002. Epub 2018 Sep 5.*

IV. Wahlstrom M, Medin J, Rydell Karlsson M. Differences in gender in Health-Related Quality of Life, blood pressure and heart rate among patients with paroxysmal atrial fibrillation after performing MediYoga.
Manuscript

CONTENTS

LIST OF ABBREVIATIONS

AF	Atrial Fibrillation
AV node	Atrioventricular node
ASTA	Arrhythmia-Specific questionnaire in Tachycardia and Arrhythmia
AHA	American Heart Association
BMI	Body Mass Index
BP	Bodily Pain
DBP	Diastolic Blood Pressure
ECG	Electrocardiogram
EQ VAS	EQ Visual Analogue Scale
GH	General Health
HR	Heart Rate
HRQoL	Health-Related Quality of Life
MCS	Mental Component Summary
MI	Myocardial Infarction
MG	Men Group
MH	Mental Health
MY	MediYoga
NT-proBNP	N-terminal prohormone Brain Natriuetic Peptide
PA	Principal Author
PAF	Paroxysmal Atrial Fibrillation
PCS	Physical Component Summary
PF	Physical Functioning
QoL	Quality of Life
RE	Role-Emotional
RP	Role-Physical
SBP	Systolic Blood Pressure
SF	Social Functioning
SF-36	Short-Form Health Survey
TM	Transcendental Meditation
UK	United Kingdom
USA	United States of America
VT	Vitality
WG	Women Group
WHO	World Health Organisation

BACKGROUND

ATRIAL FIBRILLATION

Atrial fibrillation (AF) is the most common cardiac arrhythmia in the adult population and the median age of onset is approximately 75 years (1). Patients with AF have an increased cardiovascular morbidity, including stroke and mortality (2). There are different types of atrial fibrillation: *paroxysmal* (PAF; usually short episodes of fibrillation which spontaneously converts [within 7 days] to normal heart rhythm), *persistent* (requires treatment to convert to a normal heart rhythm) and *permanent* (chronic). Because of the difference in the presentation and duration of episodes of AF, five categories have been identified, i.e. first diagnosed, paroxysmal, persistent, long-standing persistent, and permanent AF. PAF usually develops into permanent AF over time and AF is often characterized by a rapid and irregular rhythm (2).

Prevalence

The prevalence rate of AF, in the adult population, is internationally considered to be more than three percent. However, it is difficult to calculate the exact prevalence rate as many patients have silent AF, which is thus undetected (3). In an AF population, about one-fourth has PAF and these patients are younger and have a lower incidence of heart disease AF (4).

Pathophysiology and risk factors

AF consists of multiple re-entry circuits in the atria causing a chaotic rhythm, which over time is believed to cause so-called remodelling and fibrosis, often due to ageing. In younger patients, the mechanism is less clear (5). The resulting atrial rhythm becomes chaotic and rapid, up to 600 beats per minute. In this situation the AV node acts as a filter and reduces the number of beats reaching the ventricle (5), Figure I.

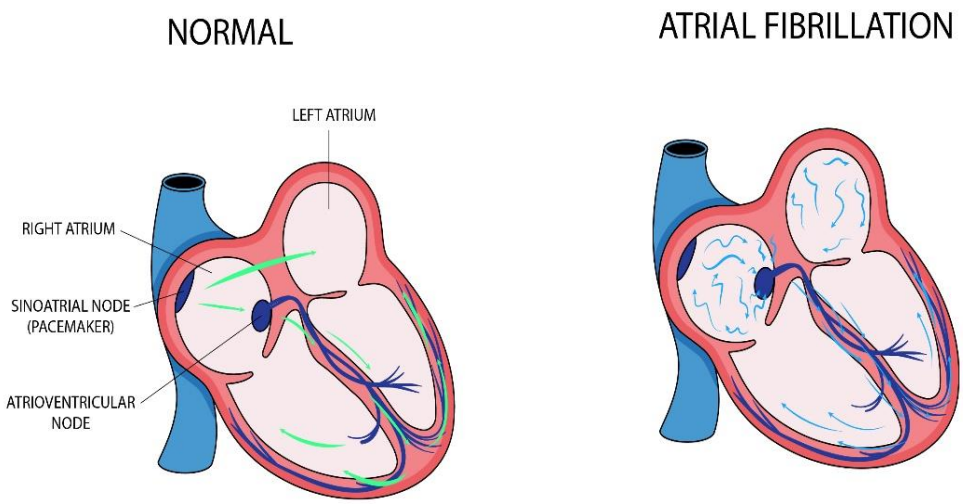


Figure I. Pictures imaging normal heart beat and heart beat in atrial fibrillation
Owner of illustration Maria Wahlström

Factors which increase the risk of the developing of AF (6-10) are shown in Table I. Apart from age and gender, hypertension is the most significant risk factor. Moreover, an increased left atrial size (11), inflammatory markers (12) as well as diabetes mellitus (13) are associated to the incidence of AF. Hyperthyroidism increases systolic blood pressure (SBP) and heart rate (HR) and is also a risk factor in the incidence of AF (14). Moreover, there is a relationship between obesity and impaired diastolic heart function for the development of AF (15). Also, obesity are linked to an increased basal inflammatory status which in turn have an impact in the remodelling process of the atrium (16). Obstructive sleep apnoea has a role in atrial remodelling, sympathovagal imbalance, inflammation and oxidative stress in patients with AF (17). Several biomarkers, including N-terminal prohormone Brain Natriuetic Peptide (NT-proBNP) and troponin, are usually ascribed to cardiac damage as well as heart failure and have been shown to be related to AF. These markers also correlate to an increased risk of stroke and mortality in patients with AF (18). NT-proBNP is a cardiac biomarker which is released in response to the atrial myocyte stretch (19, 20). Moreover, psychosocial factors such as traumatic life events, especially in older women, stress at work as well as depression have been related to the incident AF (21-23).

Table I. Risk factors and diseases

Risk factor	Disease
High age	Hypertension
Female gender	Diabetes mellitus
Smoking	Thyroide disease
Alcohol	Heart failure
High intensive training	Acute and chronic heart disease
Stress	Sleep apnoea
Obesity	Chronic kidney disease

Symptoms

Symptoms are often present in the form of palpitations, chest tightness, shortness of breath, dizziness, anxiety and/or worry (24). A rapid ventricular heart rate, during the episode of AF, may contribute to a compromised cardiac output due to impaired diastolic filling, which may generate chest tightness as well as shortness of breath. Dizziness may be associated with an imbalance in the parasympathetic and sympathetic nervous system (25). However, in about a third of the AF population there are no symptoms, so-called silent atrial fibrillation. These patients might thus be undiagnosed and neglected with respect to anticoagulation treatment (3).

Treatment

The primary treatment goals, for patients with AF, are to relieve symptoms and decrease the risk of stroke (2). The standard treatment for relief of symptoms consists of rhythm- and rate medication, cardioversion as well as ablation. Ablation is increasingly used, but is not always effective and may cause serious adverse events in 2-3 percent (26). In addition, anticoagulants are offered to patients with an increased risk of stroke indicated by CHA_2DS_2VASc scores (2). As hypertension is a significant risk factor the management of AF should include an adequate blood pressure control to prevent the incident of stroke and other cardiovascular events (27). As current treatment regimes are often not effective, alternative approaches should be examined, for example, changes in lifestyle factors (28, 29). AF is known to be related to alcohol consumption (the “holiday-heart”), thus reducing alcohol intake is an important part of possible life style changes (30). Loss of weight, in patients with high body mass index (BMI), reduces episodes of AF (31), and as a high BMI is the largest modifiable risk factor, weight reduction is an alternative component of treatment (32). Physical activity is generally beneficial to becoming healthy or maintaining health as well as in preventing cardiovascular mortality and morbidity (33).

Physical activity also helps to reduce the incidence of AF, where moderate-intensity exercise has been shown to be effective (34). However, a meta-analysis concluded that exercise, among adults with AF, showed no benefits regarding HRQoL (35). As current treatment strategies may involve changes in life-style, it is suggested that a tailored management of each individual with AF is integrated in clinical practice (36).

Gender differences in AF

More men (55 %) than women have AF in the population (37), and men have more persistent AF than PAF. Women, with AF, are older and have more hypertension as well as heart failure (38). Also, women have a lower incidence of other heart diseases than men (39). Moreover, women over 65 years with AF have also an increased risk of developing stroke (40). In addition, men seem to have a higher cardiovascular risk factor profile (41), such as hypertension, obesity and metabolic syndrome, which increases the risk of stroke (42). Regarding to treatment, women receive less cardioversion as well as more rate control medications than men (38). Also, women had more adverse effects of other treatments, as antiarrhythmic medications (43). However, the treatment strategies, in terms of gender, have over the years being improved (44).

CARING

In caring science, the health perspective is described as to "feel good and be in a position to implement what is considered to be of value in life" (45). The feeling that is linked to "health" is a general perception of well-being and the ability to perform certain tasks. This is connected not only to biological functions, but also to how we can manage our own existence based on our own experiences of life (45, 46). Health concerns both biological functions and existential issues, with both the presence and absence of disease affecting the possibility of experiencing well-being (46). Caring science also emphasizes the importance of viewing the patient as a whole, and not merely in terms of her/his disease. This holistic approach entails patients being able to see meaning, realise a context and perceive well-being based on their own perspective and experience. Moreover, the goals and overall objective in caring science is to support and strengthen patients' health processes considering health, disease and suffering. This process should be based on the patient's perception of their context in life and how the disease affects the experience of meaning and context (45). In addition, according to Dahlberg et al. (47), patients have a desire to be seen as individuals in their personal context and need tools to deal with concerns in their own life-world caused by the disease.

QUALITY OF LIFE AND HEALTH-RELATED QUALITY OF LIFE

Health is defined by the World Health Organisation (WHO) as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (48) and is an important aspect in quality of life (QoL). WHO defines QoL as “an individual's perception of their position in life in the context of the culture and value

systems in which they live and in relation to their goals, expectations, standards and concerns" (49). The concept QoL is complex, means different things to different people and may change over time. Moreover, there is no universally accepted definition. It can be described as a feeling of well-being, the need for satisfaction and happiness and the preservation of life and/or functionality (50). However, over the years, it has been generally accepted that the dimensions of physical, mental (emotional and cognitive), and social well-being should be included when measuring QoL (51).

Health-Related QoL (HRQoL) is related to the definition of QoL. However, HRQoL should, in addition to general QoL, also include behavioural or function-oriented dimensions, i.e. the patient's capacity to fulfil everyday life roles (52). Additionally, the inclusion of mental health has been discussed, as an improvement in mental health seems to be connected with an improved physical health (53).

Traditionally, health care has focused on clinical outcomes as primary measurement variables (54). However, measuring HRQoL may detect other aspects affecting patients, e.g. side effects of various treatments, which in turn may reduce HRQoL. In chronic conditions, this plays an important role, where the only possibility is to reduce symptoms. Moreover, it is important to evaluate the effect of various treatments. Therefore, evaluating HRQoL may influence decisions as to whether treatments should be initiated, maintained, changed or phased out (50). Thus, given the impact of the intervention/therapy on the patient's well-being, it is important to validate HRQoL in clinical intervention studies (50). However, as HRQoL can be measured by general or disease specific assessments, it must be related to the study's outcome (50). In addition, measuring HRQoL is a subjective appraisal, which might vary over time and seems be associated with coping strategies (55) and perceived sense of coherence (56).

Health-related quality of life and atrial fibrillation

It has been established that AF is associated with impaired HRQoL (57, 58) and, in addition, patients with AF report similar HRQoL scores as patients with other heart diseases (57). Episodic AF symptoms influence the patient's social situation and working habits (59) with feelings of anxiety and depression often being present (60). Patients report that stress is a factor affecting the appearance of episodes of AF. This in turn reduces HRQoL (61). With regard to gender differences, women estimate overall scores of health status, psychological and mental domains and QoL lower than men (38, 62-64), which may be related to women experiencing more symptoms, such as palpitations and fear/anxiety.

Additionally, impaired HRQoL, in patients with AF, increases the number of hospitalizations (65). It is recommended, therefore, that forthcoming research on new treatment strategies should include patients´ assessments of HRQoL (57, 66). Moreover, there is a need for new interventions that support patients, regarding emotions during and/or between episodes of AF (67, 68). Additionally, there is a need to develop practical strategies, such as self-management, in order to counteract AF symptoms that limit daily living (68).

There is sparse information about how to enhance HRQoL in patients with AF. A recent study concluded that a mindful-based cognitive behaviour therapy program increased HRQoL in patients with AF and was associated with a sense of coherence. This study evaluated patients together with spouses, and the program was conducted at a hospital with trained instructors (69). Moreover, structured care, with integrated nurse-led education about AF for the patients, seemed to improve HRQoL and decrease symptoms (70).

SELF-CARE AND MANAGEMENT

Orem’s self-care theory states that people are willing, and have the ability to, do whatever is necessary to prevent disease and promote their own health. They thus have a built-in motivation to implement actions for their own good (71, 72). This theory is based on the fact that if people have the knowledge and ability, they will take care of themselves. It is already used in today's health care in trying to help the patient to acquire independence, as well as increase QoL (73). However, this theory is intended to support nursing practice in caring for patients and is not directed, initially, at the patients.

At the end of the last century, Riegel et al. developed a multidisciplinary disease management program (74). This has been further developed (75) as well as having been accepted as a middle-range theory of self-care in chronic illness (76). A middle-range theory describes a limited number of variables and specific phenomena (77). This middle-range theory of self-care in chronic illness includes self-care maintenance, self-care monitoring and self-care management (76).

Over the past few years the term self-management has been described and analysed in different contexts (78, 79). It is based on social cognitive theory (80), which involves knowledge of the specific disease, perceived self-efficacy, health goal setting and strategies to retain or improve health outcomes. Bandura proposes that “self-efficacy is a focal determinant because it affects health behaviour both directly and by its influence on the other determinants” (80).

However, self-management is not a straight forward concept, due to different definitions and applications. Self-management, in this context, may be defined as, “to be active in managing a disease” (78), (s.1) which, for many patients with chronic illness, may be a lifetime task. Lorig et al. describes three self-management tasks; medical-, role- and emotional management. Medical tasks involve medical management of the conditions, such as dealing with a special diet and remembering to take medication as prescribed. Role management involves changing, creating or maintaining new behaviours or life roles. As a chronic disease may reveal emotions, such as anger, fear and depression, the final task, emotional management, is to learn to manage these emotions (78). Moreover, factors which affect self-management are personal lifestyle characteristics, health status, resources, environmental characteristics and health care system (81, 82).

The literature describes various self-management programs among different diseases, such as heart diseases, asthma and pain (74, 81, 83-85). Those programs consist of education, monitoring symptoms, medical adherence, life-style change etc., and are tailored, evaluated and conducted to address the challenges of the disease. In addition, web-based programs are suggested in order to increase self-care motivation and to support patients with AF, and are intended to have a positive impact on patients´ outcome and QoL (86).The European Society of Cardiology guidelines, 2016 (2), recommend an integrated approach to the management of AF, as well as making suggestions to nurses and health professionals as how to provide those interventions discussed and recommended (87). We have found only one study, currently in progress, which is evaluating a self-management program among patients with AF (88). This protocol includes education and behaviour change strategies for patients with AF.

COMPLEMENTARY THERAPIES

Complementary and alternative medicine have been described as forms of treatment that are outside traditional, established scientific realms of knowledge (89). Over the years, definitions have changed and complementary therapies have come to be regarded as an *addition* to traditional care. Alternative medicine is not conducted *in concert* with established care (89). There are many different kinds of complementary and alternative therapies (90) widely used in health-care in Australia (91), the USA (92) and UK (93). WHO states that the use of complementary medicine has increased significantly globally and that countries should evaluate and perhaps implement selected complementary therapies in health-care (94).

A recent review shows that patients with AF often seek alternative methods to alleviate their symptoms (95). In patients with persistent AF, acupuncture treatment prevents arrhythmic recurrences after cardioversion, when compared to amiodarone (96).

Soft music therapy, as a complement to standard treatment, aims to reduce symptoms of anxiety, lower blood pressure and reduce heart rate after thoracic surgery (97). Also, music therapy has been shown to reduce anxiety and enhance well-being in patients during coronary angiography (98). A Cochrane analysis reports that music may achieve a better QoL, lower blood pressure and heart rate, improve sleep and reduce worry (99). However, these results should be viewed with caution as the studies involved different kinds of music and interventions.

Mindfulness is characterized as complementary therapy and the concept is derived from yoga and may be described as a conscious in presence, awareness and actions (100). In a review, the authors concluded that mindfulness may reduce symptoms, both physical and mental, in combination with treatment in cancer, cardiovascular disease, depression and chronic pain (101). Another complementary therapy is transcendental meditation (TM), meditation with mantra, which has positive impact in blood pressure and is recommended by the American Heart Association (AHA), (102). This meditation technique is used in yoga, which is another complementary therapy.

YOGA

The word yoga is Sanskrit and is an integration of mind, body and soul. Yoga, described in the Vedas approximately 5,000 years ago, originates from India and was described in the West, for the first time, in the 19th century (103). The practising of a yoga consists of three components: movements, breathing techniques, and meditation (104). The primal yoga form, Ashtangayoga, has now been explored as an effective form of exercise (104). Hatha- and Kundaliniyoga are derived from Ashtangayoga (103). Hathayoga is a more meditative yoga form than Ashtangayoga and more physical than Kundaliniyoga. Kundaliniyoga is the most meditative form of yoga and is performed with calm movements, focused on breathing techniques and meditation. The first institute to evaluate the effect of yoga on bodily functions was the Kaivalyadhama Centre, India, in 1923. During the past ten years the number of published articles about yoga and its effects on health has increased threefold (105).

Yoga as therapy

Practicing yoga may contribute to calming biological functions and relieving stress (104), as well as improving the balance of the parasympathetic and sympathetic nervous systems (106). According to a review, yoga may improve risk factors, such as hypertension and hyperlipidaemia (107). In addition, heart rate decreased after performing yoga (108-110) and blood pressure in patients with hypertension (111, 112). Breathing techniques, alternately slow and fast breathing, which are used in yoga, show positive effects on blood pressure (113).

A deep breathing technique also has a positive impact on hypertension (114-116), although larger randomized studies are needed (117). In a small study, NT-proBNP decreased in patients with heart failure after practising yoga (118).

In heart rehabilitation, yoga has been used as a therapeutic treatment, and has proved beneficial regarding blood pressure, hyperlipidaemia, heart rate and blood glucose (115, 116). In addition, yoga has had the same effects as standard treatment (physical exercise) in patients with chronic illness (e.g. heart disease and stroke) (114). In caring, nurses may advise patients with heart failure to practise yoga as self-care to improve their health (119).

Yoga has been suggested as a way of increasing QoL in patients with heart failure (120, 121) and hypertension (111). Moreover, depression and anxiety decreased in patients with symptomatic PAF after performing yoga (109) as well as in patients with hypertension (122). Positive effects of yoga on QoL have been described in the treatment of other conditions, such as breast cancer (123) and low-back pain (124). In a meta-analysis, the authors concluded that meditative movements, such as yoga, increase QoL in adults with various conditions, such as breast cancer, schizophrenia, low-back pain, heart-failure and diabetes mellitus (125).

MediYoga

MediYoga is a therapeutic form of yoga derived from Kundaliniyoga. This form of yoga has been evaluated by the MediYoga Institute, Stockholm, Sweden (126). The MediYoga program has been evaluated for use with different conditions and diseases, including heart diseases. The program for heart diseases is designed to stretch the musculature in the chest to achieve better breathing and relax the body. MediYoga is based on a deep breathing technique and consists of slow movements as well as meditation, Supplement I-II. MediYoga is commonly performed lying or sitting on a blanket, but can also be performed sitting on a chair, Figure II. MediYoga may be performed by all ages (126). It is considered to be cost-effective and increase QoL more than standard treatment (physiotherapy) in patients with low-back pain (127). Patients have also reported that MediYoga has provided them with a tool to handle their stress (128).

Figure II. Movements performed in the MediYoga program by permission of photograph Anton Svedberg

AIM

OVERALL AIM

The overall aim of this thesis was to study the effects of MediYoga among patients with PAF. In addition, to describe perceptions and experiences of MediYoga as well as to evaluate gender differences.

SPECIFIC AIM

I. To analyse the effects of yoga on HRQoL (SF-36 and EQ Visual Analog Scale), blood pressure and heart rate among patients with PAF.

II. To evaluate the effects of MediYoga in respect of HRQoL (SF-36 and ASTA), blood pressure, heart rate as well as NT-proBNP among patients with symptomatic PAF, compared to standard therapy or relaxation.

III. To describe perceptions and experiences of MediYoga among patients with symptomatic PAF.

IV. To evaluate gender differences, after performing MediYoga, in HRQoL, blood pressure and heart rate among patients with PAF. Furthermore, to evaluate differences, in HRQoL, blood pressure and heart rate with-in the male and female group.

DESIGN AND METHODS

This thesis consists of four papers with quantitative designs (Papers **I**, **II** and **IV**) and a qualitative design (Paper **III**). An overview of the four sub-studies is given in Table II. Also, a description of Paper I and II is provided to clarify similarities and differences in inclusion- and exlusion criterions as well as assessments, Table III.

Table II. Overview of the four papers in this thesis

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Design	Randomized controlled design - a pilot study	Three-armed, randomized controlled design with stratification in gender	Semi-structured interviews design	Comparative design
Sample and study group	80 patients were randomized to yoga (*n*=40) or control group (*n*=40)	132 patients were randomized to yoga (*n*=44), relaxation (*n*=44) or control group (*n*=44)	12 participants whom performed MediYoga from Paper II were included	37 females and 34 males were included from yoga groups Papers I and II
Data collection	HRQoL questionnaire (SF-36, EQ-5D VAS analogue scale), blood pressure, heart rate, demographic data, data from medical records, medications, amount of yoga sessions at home	HRQoL questionnaires (SF-36, ASTA), blood pressure, heart rate, NT-proBNP, demographic data, data from medical records, medications, document of symptomatic palpitations, amount of yoga sessions at home	Individual interviews	HRQoL questionnaire (SF-36), blood pressure, heart rate, demographic data

Table III. Description of Paper I and Paper II in inclusion- and exlusion criterions as well as assessments

Inclusion criterion	Exclusion criterion	Paper I Pilot study Yoga/Control	Paper II Yoga/Relaxation/ Control
Paroxysmal atrial fibrillation		**X**	
Symptomatic paroxysmal atrial fibrillation			**X**
	Diabetes mellitus		**X**
	Untreated hyperthyroidism		**X**
	Multiple concurrent medical conditions	**X**	**X**
	Cognitive dysfunction	**X**	**X**
	Difficulties to understanding the Swedish language	**X**	**X**
Assessment			
SF-36		**X**	**X**
EQ VAS		**X**	
ASTA			**X**
Blood pressure		**X**	**X**
Heart rate		**X**	**X**
NT-proBNP			**X**

STUDY GROUPS

The study groups which were used in Paper I-IV are described in Table IV

Table IV. Descriptions of study groups used in Paper I-IV

	Paper I	Paper II	Paper III	Paper IV
MediYoga	X	X	X	X
Control	X	X		
Relaxation		X		

Papers I-IV

The MediYoga group performed yoga an hour a week for 12 weeks at the hospital. The MediYoga group received a CD-record with the yoga program and was encouraged to perform MediYoga at home. The program consisted of light movements, meditation and relaxation and could be performed sitting in a chair or on the floor, as described in **Supplement I-II**.

The MediYoga group also received standard medical treatment such as rhythm and rate regulating drugs and in a few cases cardioversion.

Papers I-II

The control group only received standard treatment.

Paper II

The relaxation group was listened to relaxing music, in group sessions, for half an hour, once a week for 12 weeks at the hospital. The relaxing music in this study has been used in stress relief programs (98, 129).

The relaxation group also received standard treatment.

PARTICIPANTS AND SETTING

All studies were conducted at Danderyd's University Hospital, Stockholm, Sweden.

Paper I

The study was conducted between 2009 and 2012. Eighty–eight patients with PAF were identified from medical records and recommendations from the staff at the arrhythmia department's out-patient clinic. They were asked by telephone to participate. Eighty patients fulfilled the inclusion criteria and agreed to participate in the study, Figure III. An informed consent was conducted before the randomization.

The inclusion criterion was a diagnosis of PAF, either early or new, and should have been on medical treatment for PAF for at least three months.

Patients with multiple, concurrent medical conditions (i.e. cancer, heart failure and renal failure with symptoms), cognitive dysfunction or with difficulties in understanding the Swedish language were excluded.

The patients were randomly assigned in blocks of five, by a permuted block randomization, inspired by Polit and Beck (130).

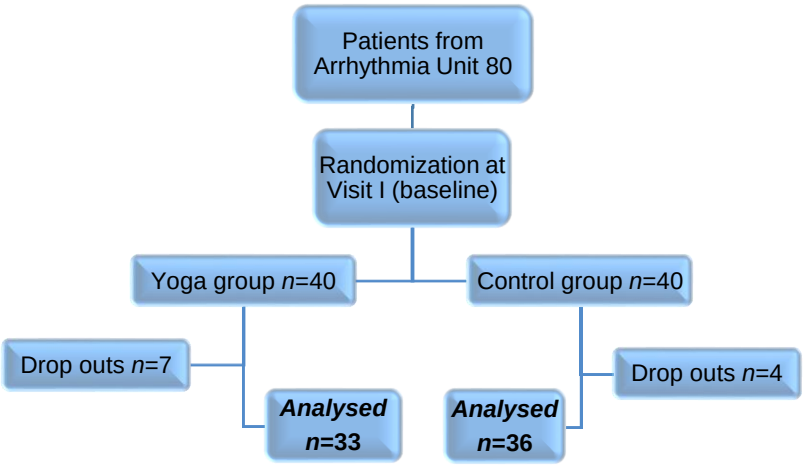


Figure III. Flow-chart and inclusion paper I

Paper II

This study was conducted between 2014 and 2017 and the participants were randomly selected, with stratification for gender. The patients were identified from an arrhythmia unit's medical records and/or referrals from one other arrhythmia department. The patients were contacted by telephone by the principal author (PA) and were informed verbally about the study. If patients were interested in participating, the PA sent information about the study and an invitation to the first visit. The inclusion criterion was a diagnosis of symptomatic PAF, defined as at least one episode of ECG verified AF during the past six months. The patients had been receiving pharmacological treatment for at least the past three months and had a recent, within the past year, diagnosis of PAF.

Patients with diabetes mellitus and with an untreated hyperthyroidism were excluded. Patients with difficulties understanding the Swedish language, those with multiple concurrent medical conditions (i.e. advanced cancer, heart failure and renal failure) or/and cognitive dysfunction were also excluded.

Of 1,532 screened patients, 152 fulfilled the inclusion criteria and 132 patients agreed to participate in the study, Figure IV. The high number of patients who could not participate was explained by incorrect diagnoses (persistent AF instead of PAF), diabetes mellitus, not adjusted TSH values and not symptomatic PAF.

An informed consent was conducted before collecting any assessments as well as performing the randomization. At the end of the baseline visit the participants were randomized to blocks of six (131).

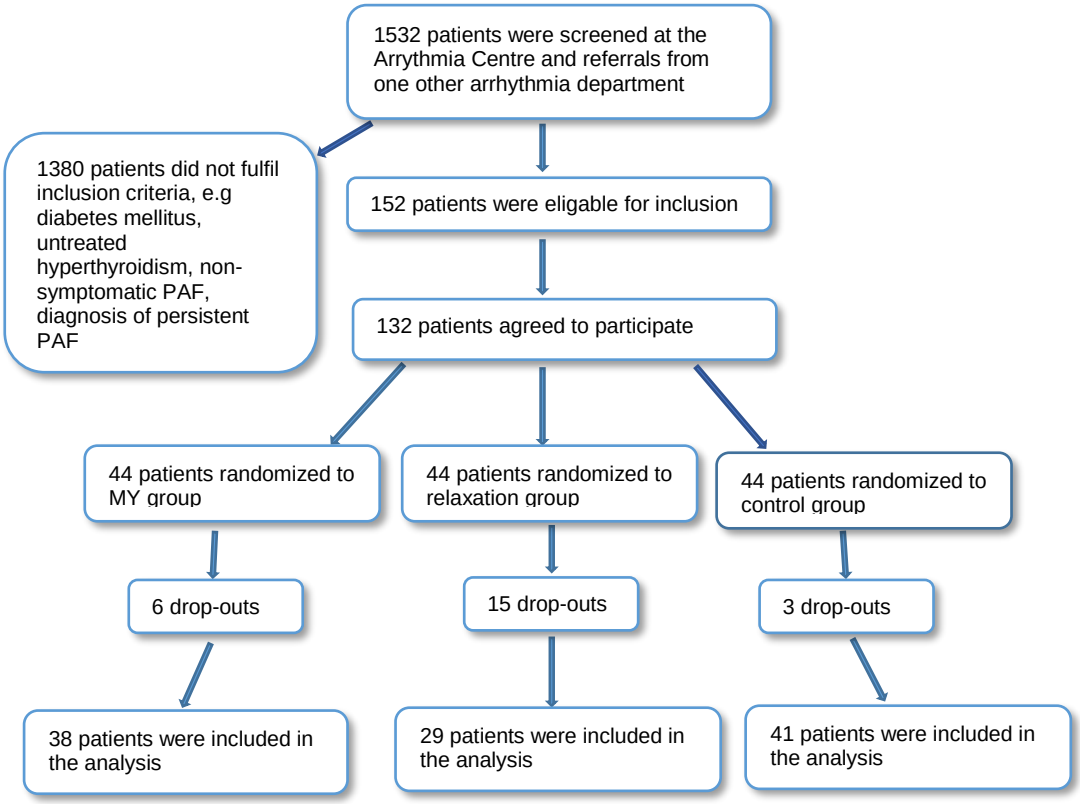


Figure IV. Inclusion flow-chart and drop-outs, paper II

Paper III

The participants were enrolled from Paper II, from February 2015 to May 2017, and were asked at the first visit (baseline) to participate in the study (Paper III). Meanwhile the study (Paper II) was in progress; the participants were selected consecutively at the second visit and asked by the PA to participate in the interview study. The selection of participants to the interview study was carried out according to the principal author's time frame, while including participants in **Paper II.** The subsequent interview was scheduled to suit the participants. Fifteen patients were approached, all agreed to participate in the interview study, but only twelve patients were included.

Paper IV

Females and males were included from **Paper I** (females *n*=17, males *n*=16) and **Paper II** (females *n*=20, males *n*=18). Flow-chart is described in Figure V.

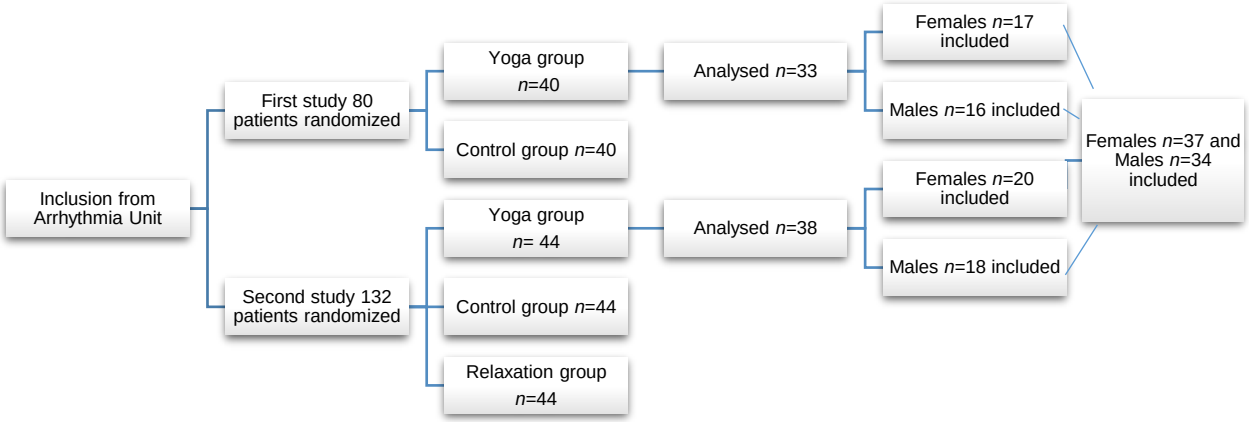


Figure V. Inclusion flow-chart, paper IV

DATA COLLECTION

Paper I

All participants made two visits; baseline and end of study (with a visit-window of ≤ 2 weeks). At both visits the participants met the PA to assess HRQoL and hemodynamic parameters. The two visits were held in the morning in the same room at the hospital for both groups. The participants completed the HRQoL questionnaires, at the baseline visit, before randomization to their respective groups. Treatment history was collected from medical records at baseline and at the end of the study. The participants informed the PA, at end of the study, of how many yoga sessions they had conducted at home.

Paper II

The participants attended two appointments (to the PA), at baseline and after 12 weeks (visit window ≤ 2 weeks).

Data collection (i.e. demographics [such as sleeping habits, alcohol use, employment, exercise habits and life events], HRQoL questionnaires, hemodynamic, and venous blood samples) took place at both visits. Data were collected at the baseline visit before randomization. Medication information was collected from the medical records and confirmed by the participants at baseline and at the end of the study. The participants were encouraged to document their symptomatic episodes of palpitations during the study. The same environment was used for all visits and there were no changes over time. The participants informed the PA, at the end of the study, about how many yoga sessions they had performed at home.

Paper III

Data were obtained from semi-structured interviews that were conducted face to face. All three authors performed the interviews individually. The interviews were all carried out in the same venue at the hospital. To ensure consistency (132), a written semi-structured interview guide, with open and follow-up questions, was constructed and used, Supplement III. Two participants were asked to participate in pilot-interviews. The data from these were evaluated by the authors and the questions were revised slightly to elicit responses more closely related to the aim of the study. The pilot-interviews were included in the study. The authors perceived a repeated pattern in the analysis after ten interviews. To ensure a sufficiently large sample (133), two more patients were included.

Paper IV

Data were obtained from **Paper I** and **Paper II,** respondents from the MediYoga groups. In this, we included assessments such as HRQoL and hemodynamic parameters, which were measured at baseline and at the end of study.

ASSESSMENTS

Health-related questionnaires

EQ-5D Visual Analog Scale

In **Paper I** we used the EQ-5D Visual Analog Scale (EQ VAS) which is a part of EQ-5D and is a standardized, validated and reliable scale (18, 19). EQ-5D consists of two parts: a descriptive component and a Visual Analog Scale (VAS). In this study, we used only the EQ VAS. This scale measures self-rated health status and consists of a scale between 0-100, where 100 is the best possible state of QoL. The instruction was, ”We would like you to use this scale to indicate how good or bad your health is, right now”.

EQ-5D is a well-known and widely used assessment instrument. It has been used worldwide in various AF contexts (69, 70, 134, 135).

Short-Form Health Survey (SF-36)

In **Papers I-II, IV** we used the Short-Form Health Survey (SF-36), which is a generic, validated and reliable HRQoL questionnaire comprising 36 items (136, 137) that measure the individual’s physical and mental health. The questions are answered by choosing five or six possible responses: very poor, poor, little poor, little good, good or very good. The questions are divided into eight subscales; physical functioning (PF), role-physical; because of physical health problems (RP), bodily pain (BP), and general health (GH), which also generate the dimension Physical components summary (PCS). Vitality is addressed by: energy/fatigue (VT), social functioning (SF), role-emotional; role limitations because of emotional problems (RE), mental health; psychological distress and psychological well-being (MH), which also generate the dimension Mental components summary (MCS). The items, sub-scales and dimensions are scored, summarized and analysed with syntax into scores of 0-100, where 100 is the best state of HRQoL.

SF-36 is a well-known assessment instrument, takes 10-15 minutes to answer and has been used worldwide in various AF contexts (35, 138-141).

Arrhythmia-Specific questionnaire in Tachycardia and Arrhythmia (ASTA)

In **Paper II** we used ASTA. This is a disease-specific validated questionnaire which is divided into three parts (142, 143). Part I evaluates the latest episode of arrhythmia and current medication. Part II assesses symptom burden, and includes a 9-item symptom scale (ASTA symptom scale) with 4 possible responses. There are also questions regarding the frequency and the duration of an arrhythmia episode, experience of near syncope, syncope, and palpitations in connection with arrhythmia. Part III assesses HRQoL, using 13-items (ASTA HRQoL scale), with the same 4 responses as for the symptom scale. The ASTA HRQoL scale is divided further into a physical and a mental subscale. The values range from 0 to 100 where higher scores reflect a higher symptom burden and a worse effect on HRQoL due to the arrhythmia. This questionnaire has been validated with SF-36 (70, 142, 143).

Blood pressure, heart rate and NT-proBNP

Papers I-II, IV

Blood pressure and HR were measured, after a resting period of five minutes (144), with Omron HEM-711DLXCAN.

Paper II

NT-proBNP were analysed with Roche h232 (145).

Demographic data

Measurements of height, weight and waist were taken by the PA. The PA also collected demographic information from the participants, e.g. marital status, income, exercise activity, alcohol use, working and sleeping habits.

DATA ANALYSIS

The various methods of analysis used in this thesis are described in Table V.

Table V. Methods of analysis

Data analysis	Paper I	Paper II	Paper III	Paper IV
Chi-square test	X	X		X
Student's *t*-test	X	X		X
Mann Whitney U test	X			
The Wilcoxon Signed Ranks test	X			
Analysis of covariance (ANCOVA)	X	X		
One-way ANOVA		X		
Sidak as post-hoc test		X		
Linear regression analysis				X
Content analysis			X	

Categorical variables are presented as median (range) or percent, and continuous variables are presented as mean (standard deviation, [SD]). A chi-square test was performed for proportions, and analysis of covariance (ANCOVA) was used if a statistically significant relationship was demonstrated between the groups in demographic data.

As **Paper I** is a pilot study, a power calculation was not made, although we looked at earlier yoga intervention studies to obtain an indication as to a satisfactory sample size (146).

Paper II The power calculation was based on data from the pilot study. A significance level of $p < 0.05$ was chosen, within groups, with an eight-point difference for all the scales of SF-36 (147). To detect an eight-point mean difference in the scales of SF-36 between the groups, using an alpha of 0.016 and a power of 0.80, 44 patients were required in each group, including 20 percent of drop-outs.

Paper IV A linear regression analysis within PCS (SF-36), MCS (SF-36) as well as gender, was performed in order to ascertain whether the sample from the two studies was of sufficient size. There was no significant interaction between the two groups.

In **Paper I** the variables have been processed statistically using the data analysis program, SPSS version 12. In **Papers II and IV** we used the data analysis program IBM SPSS statistics version 24 (IBM SPSS Statistics, IBM Corporation, Armonk, New York).

Paper III The interviews were analysed using qualitative content analysis, with an inductive method, in a manifest approach (148). Content analysis is a method of systematically analysing written or verbal communication (149). A manual method was used to organize the data (150). The interviews were audio recorded and transcribed verbatim by the PA. To verify that the transcription was correct, the recorded interviews were compared with the text. After several discussions between the authors, the meaning units with the same pattern and which corresponded with the aim of the study, were identified and labelled by codes. Subsequently, sub-categories and categories were identified. The duration of the interviews was 17- 32 minutes and they were conducted not more than four weeks after the final intervention of the previous study.

One contribution of a qualitative method is to capture stories to understand people's perspectives and experiences where the story, 'well-told' and well-documented, opens a window into the world of the studied cases. Content analysis is one of many methods used to analyse text from interviews and can be conducted using an inductive and deductive approach. An inductive approach has a known phenomenon where the researcher includes data and subsequently forms hypotheses and theories. A deductive approach entails testing already formulated hypotheses and theories. In this study, we used an inductive approach with the purpose of exploring an already formulated aim without a theory or hypothesis. In this context, we wanted to examine patients' experiences and perceptions. In a manifest approach, as in this paper, texts are interpreted less than in a latent approach. The challenge is to ensure the credibility of the analysis of categories and themes so as to attain a balance in the interpretations (149, 151).

ETHICAL CONSIDERATIONS

All the papers conform to the principles outlined in the Declaration of Helsinki (152) and were approved by the Ethics Committee of Stockholm, Sweden (**Paper I** DNR 2008/1983-31/2 and **Papers II-IV** DNR 2013/953-31/4).

All participants received verbal and written information about the study. All participants provided written informed consent at baseline and were informed that they were free to withdraw their participation at any time and that the non-participation would not influence the participants´ future health care.

A counsellor was attached to the study to offer help to any patients experiencing emotional reactions arising from answering the questionnaires and being interviewed.

In Paper III the participants were informed that it was possible to discontinue the interview without given a reason and that the non-participation would not influence the participants´ future health care.

Ethical considerations round the MediYoga program were conducted before the studies started. There were no reports that MediYoga caused any adverse events, although, a soreness in the muscles were noticed and described from the participants. The participants were also informed that blood sample may cause some pain and in worse case a bruise and an infection. There was no report from the patients that the blood sample had caused any events.

RESULTS

PAPER I

In the MediYoga group, 33 patients completed the intervention. Seven patients (17.5%) – four men (10%) and three women (7.5%) – dropped out before the completion of the study period. In the control group, 36 patients completed the study period; four male patients (10%) ceased to participate. Baseline characteristics are shown in Table VI.

On average, the participants in the MediYoga group performed ten yoga sessions (range 8-12) at the hospital. At-home yoga was conducted a median of 2 (range 1-4) sessions per week.

Table VI. Baseline Characteristics

	MediYoga *n*=33	**Control *n*=36**
Age	64±7	63±8
Female gender	16 (48)	25 (71)
Hypertension	14 (42)	19 (52)
Diabetes mellitus	0 (0)	3 (8)
Stroke/Transitory Ischemic Attack	5 (15)	0 (0)
Ischemic Heart disease	0 (0)	1(3)
Heart failure	0 (0)	1(3)
Medications		
Beta blockers	27 (82)	30 (83)
Calcium channel blockers	10 (30)	11(31)
Antiarrhythmic medications	13 (39)	21 (58)
ACE (Angiotensin enzyme inhibitor)	9 (27)	15 (42)
Statins	9 (27)	14 (39)
Warfarin	18 (55)	20 (56)
Aspirin	10 (30)	12 (33)

Values are *n* (%) and mean ±SD.

Health-related quality of life

At baseline, the MediYoga group reported a significantly lower QoL on the EQ VAS. After 12 weeks, the patients' EQ VAS scores had increased significantly (p <0.001) in the MediYoga group, whereas the control group reported no change (p=0.622). The same pattern was seen in SF-36 MCS, with significant improvement in the MediYoga group (p <0.001); but lacking in the control group (p=0.782). There was a significant difference in MCS at baseline between the groups (p=0.001) as well as an increase for the MediYoga group at the end of study (p=0.016), Table VII.

Table VII. Health-Related Quality of Life

Type of score	Yoga Baseline *n*= 33	Yoga Follow-up *n*=33	Control Baseline *n*= 36	Control Follow-up *n*=36	Between groups Baseline *p*-value	Between Groups Follow-up *p*-value	Within Yoga Follow-up *p*-value	Within Control Follow-up *p*-value
EQ-5D VAS-scale	70.0 (20.0–95.0)	80.0 (50.0–100.0)	80.0 (30.0-100.0)	80.0 (30.0-95.0)	0.025*	0.598	0.001*	0.622
SF-36 MCS	42.1 (17.6-53.5)	50.6 (24.0-55.2)	53.0 (14.7-56.0)	52.7 (24.5-57.1)	0.001*	0.016*	0.001*	0.782
SF-36 PCS	46.7 (28.8-60.6)	50.2 (27.6-59.1)	52.2 (25.2-65.0)	49.0 (29.1-61.6)	0.172	0.837	0.091	0.321

Values are median (interquartile range). * Statistically significant with a *p*-value < 0.05. SF-36; Short-Form Health Survey. Dimensions of SF-36; PCS; Physical Components Summary, MCS; Mental Components Summary.

Hemodynamic Assessments

After 12 weeks of MediYoga, systolic (p=0.033) and diastolic (p<0.001) blood pressure as well as heart rate (p=0.024) were significantly lower in the MediYoga group compared to the control group. There was also a reduction within the MediYoga group in diastolic blood pressure (p<0.001) and within the control group in heart rate (p=0.05).Table VIII.

Table VIII. Hemodynamic assessments

	MediYoga Baseline *n*= 33	**Control** Baseline *n*= 36	**MediYoga** Follow-up *n*=33	**Control** Follow-up *n*=36	**Between Groups** Baseline *p*-value	**Between Groups** Follow-up *p*- value	**Within MediYoga** Follow-up *p*- value	**Within Control** Follow-up *p*- value
Heart rate/ minute	64±13	65±14	61±13	70±19	0.740	0.024*	0.183	0.05*
SBP mm-Hg	137±16	138±18	132±17	141±17	0.727	0.033*	0.69	0.410
DBP mm-Hg	84±9	84±12	77±10	86±12	0.735	0.001*	<0.001*	0.250

* Statistically significant with a *p*- value < 0.05. SBP: Systolic Blood pressure; DBP: Diastolic Blood Pressure.

PAPER II

There were six drop-outs in the MediYoga group (16%), four men and two women, fifteen drop-outs (34%), eight women and seven men in the relaxation group and four drop-outs (9%), three men and one woman in the control group, Figure IV. The MediYoga group performed yoga sessions at home, with a median of 12 sessions (0 to 60) during 12 weeks.

Clinical characteristics of drop-outs are shown in Table IX.

Table IX. Clinical Characteristics drop-outs

	MediYoga *n*=6	Control *n*=3	Relaxation *n*=15
Female gender	2 (33)	1 (33)	8 (53)
Age	63±6	67±11	66±10
Age median	62 (56-73)	66 (56-78)	70 (44-77)
BMI	29±7	30±6	25±4
BMI median	28 (23-43)	29 (25-37)	25 (21-34)
Good sleep	2 (33)	2 (67)	9 (33)
Employment	2 (33)	2 (67)	5 (33)
High intensive training	1 (17)	1 (33)	0
Life events	3	2	4
Alcohol glasses/week	7±2	5±2	4±2
Hypertension	4	2	6
Stroke	1	1	4
MI	-	-	-
Heart failure	-	-	-
Sleep apnea	-	-	-

Values are mean (SD), n (%). MI; myocardial infarction. BMI; body mass index.

There were more participants in the MediYoga group with hypertension compared to the control and relaxation group. When adjusted for hypertension in SF-36 (subscales and domains), ASTA (all three parts), BP, HR and NT-Pro-BNP there was no difference between the groups. There were no differences between the groups when adjusted for outliers at the end of study, with respect to documented episodes of AF (yoga 13.6±8, control 9±8, relaxation 7.6±6). The attendance rate at the MediYoga group showed a median nine (7 to 11) and for the relaxation group median six (3 to 12). There were no adverse events reported by the MediYoga- or relaxation groups during the study. Clinical characteristics are shown in Table X.

Table X. Clinical Characteristics

	MediYoga *n*= 38	Control *n*=41	Relaxation *n*=29
Age	65 ±9	63±10	64±15
Female gender	20 (53)	21 (51)	14 (48)
BMI (kg/m²)	26.5±3.4	25.4±6.1	28.2±12.1
Employment	16 (42)	20 (49)	20 (69)
Good sleep	34 (89)	34 (83)	20 (69)
High intensive exercise	8 (21)	7 (17)	7 (24)
Life events	8 (21)	15 (37)	10 (35)
Alcohol glasses/week	3.1 (0 - 15)	3.1 (0 - 14)	3.8 (0 - 18)
Medical history			
Hypertension	22 (58)*	11 (27)	6 (21)
Stroke	1 (3)	-	-
MI	-	2 (5)	-
Heart failure	-	-	1 (3)
Sleep apnoea	4 (11)	5 (12)	4 (14)
CHA_2DS_s VASc	2 (0 - 4)	1 (0 - 4)	1 (0 - 4)
Medications			
Beta blockers	25 (66)	28 (68)	20 (69)
Antiarrhythmics drugs	16 (42)	19 (46)	8 (28)
Calcium antagonists	7 (18)	4 (10)	3 (10)
DOAC (direct oral anticoagulants)	18 (47)	16 (39)	14 (48)
Warfarin	11 (29)	10 (24)	1(3)
ASA (aspirin)	2 (5)	2 (5)	2 (7)

Values are *n* (%) and mean ±SD. CHA_2DS_s VASc is described in median (range).
* Statistically significant with a *p*-value < 0.05

Health-related quality of life

No differences were observed between the groups regarding SF-36, subscales and domains, at the end of the study. However, there was a significant improvement with-in the MediYoga group in the subscales bodily pain (BP), p=0.019, general health, (GH), p=0.037, social functioning (SF), p=0.029, mental health (MH), p=0.030, and mental component summary (MCS), p=0.019. Over time, there were no differences within relaxation- or control groups regarding subscales and domains of SF-36, Table XI. Moreover, there were no differences in ASTA, all three parts, between the groups at the end of the study. There was a significant improvement in HRQoL, ASTA, subscale MH (p=0.035) with-in the control group but no differences were seen within the yoga- or relaxation groups, Table XI.

Table XI. Health-related quality of life questionnaires

	MediYoga *n*=38 Baseline	MediYoga *n*=38 End of study	Control *n*=41 Baseline	Control *n*=41 End of study	Relaxation *n*=29 Baseline	Relaxation *n*=29 End of study	Between groups MY/Control/ Relaxation End of study *p-value*	Within MediYoga End of study *p-value*	Within Control End of study *p-value*	Within Relaxation End of study *p-value*
Typ of score SF-36										
PF	83±18	86±14	87±13	85±14	84±14	82±12	0.559	0.485	0.565	0.564
RP	61±43	68±40	72±37	58±43	59±42	47±44	0.234	0.485	0.100	0.316
BP	70±27	83±19	80±24	76±23	75±24	69±24	0.041	0.019*	0.448	0.389
GH	61±18	70±17	65±22	65±21	62±19	61±20	0.240	0.037*	0.924	0.389
VT	53±18	61±17	55±22	57±16	56±17	53±18	0.244	0.076	0.553	0.570
SF	75±28	88±18	81±23	83±19	75±28	75±30	0.295	0.029*	0.631	0.962
RE	60±43	77±35	74±36	66±40	58±39	56±47	0.131	0.058	0.372	0.918
MH	64±16	72±16	67±16	67±13	65±16	66±16	0.335	0.030*	0.905	0.836
PCS	48±9	50±8	50±9	48±8	49±8	46±8	0.176	0.337	0.266	0.156
MCS	40±11	46±9	43±12	43±9	40±12	41±14	0.266	0.019*	0.266	0.849
Typ of score ASTA										
Symptom scale	26 ±15	27±18	33±18	30±16	34±16	30±17	0.093	0.556	0.051	0.052
HRQoL scale	22±14	21±17	29±21	25±18	23±20	29±25	0.363	0.440	0.067	0.425
HRQoL subscale physical	21±16	21±19	30±23	26±21	28±24	28±26	0.330	0.951	0.152	0.941
HRQoL subscale mental	23±16	20±17	29±20	23±16	32±25	29±25	0.606	0.096	0.035*	0.107

Values are mean and SD.* Statistically significant with a *p*-value < 0.05. MY; MediYoga. SF-36; Short form health survey. Sub-scales of SF-36; PF; physical functioning, RP; role-physical, BP; bodily pain, GH; general health, VT; vitality, SF; social functioning, RE; role-emotional, MH; mental health. Dimensions of SF-36; PCS; Physical Components Summary, MCS; aental Components Summary. ASTA; Arrhythmia-Specific questionnaire in Tachycardia and Arrhythmia

Blood Pressure

Between the MediYoga group (134±18 to 127±13) the control group (126±17 to 127±15), *p* = 0.041, and the relaxation group (131±17 to 125±12) no differences were observed in systolic blood pressure (SBP). There was a significant difference within the MediYoga group (*p*=0.008) and within the relaxation group (*p*= 0.025), over time. Moreover, diastolic blood pressure (DBP) decreased significantly in the MediYoga group (79±9 to 74 ±9) compared to the control group (76±9 to 79±8), *p* = 0.005, but no difference was seen in comparison to the relaxation group (76±9 to 77±8), Figure VIa and VIb. There was also a significant difference in DBP within the MediYoga group (*p*=0.002).

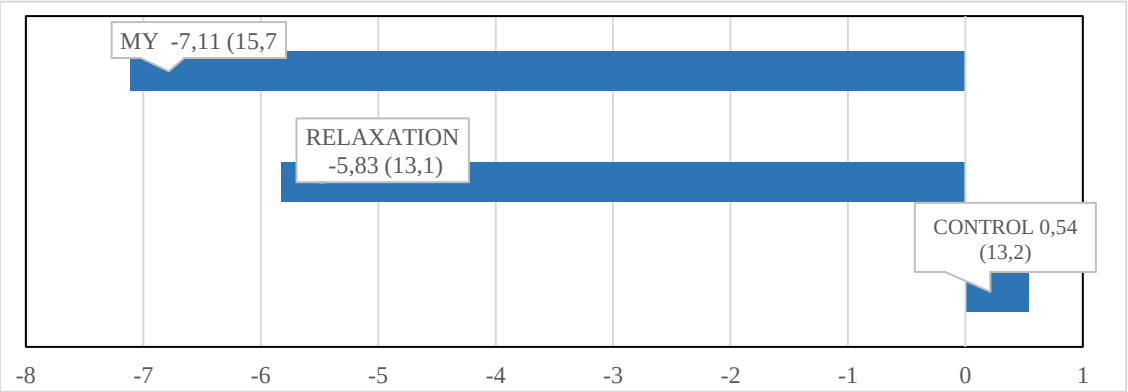


Figure VI a. Changes in systolic blood pressure with-in the groups over time. Mean differences in systolic blood pressure within MediYoga (MY), relaxation and control group after 12 weeks (SD; standard deviation).

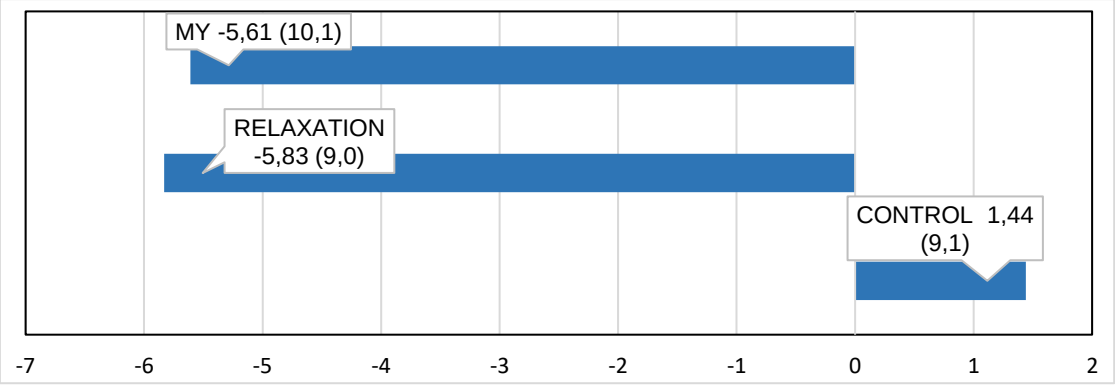
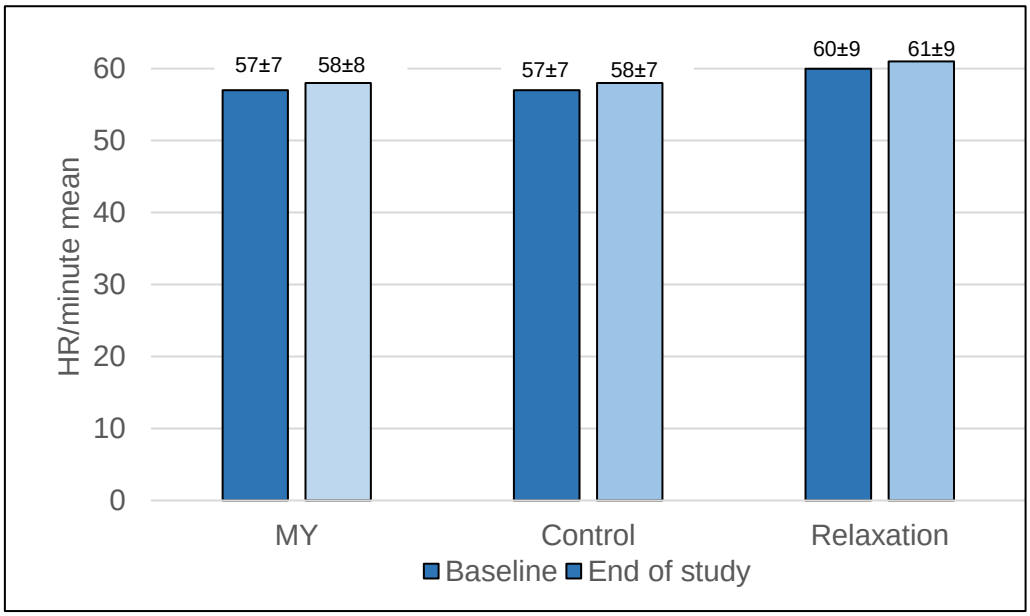


Figure VI b. Changes in diastolic blood pressure with-in groups over time Mean differences in diastolic blood pressure within MediYoga (MY), relaxation and control group after 12 weeks (SD; standard deviation).

Heart rate and NT-proBNP

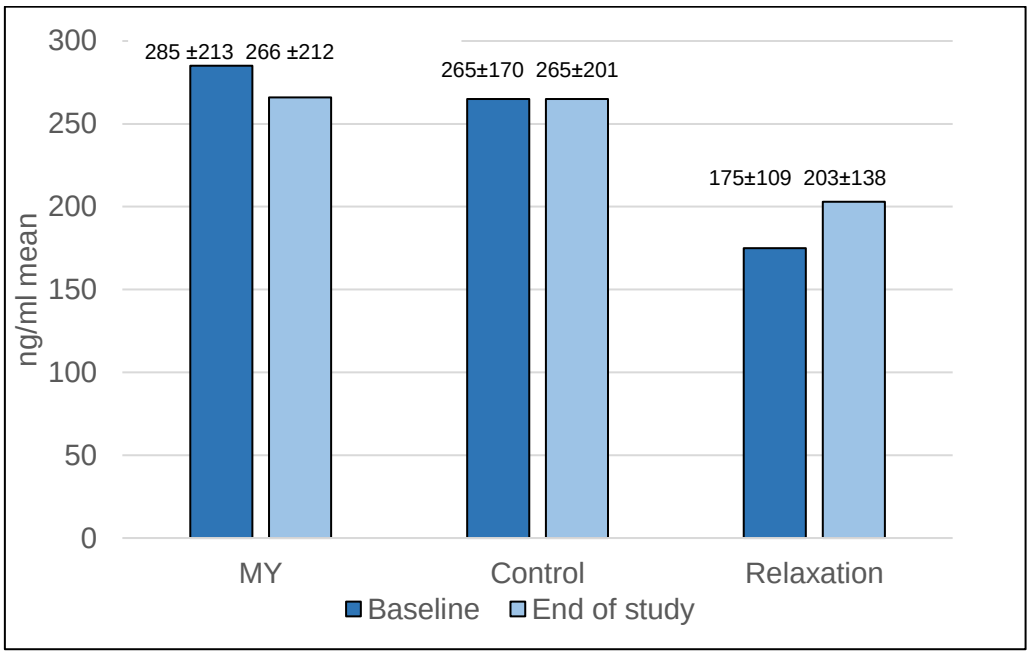
Regarding HR there were no differences between the groups; MediYoga/control (*p*=0.999), MediYoga/relaxation (*p*=0.993) and control/relaxation (*p*=0.976) or NT-proBNP between the groups; MediYoga/control (*p*=0.860), MediYoga/relaxation (*p*=0.364) and control/relaxation (*p*=0.777) at the end of study. There were significant differences in NT-proBNP between the MediYoga and relaxation groups at baseline (*p*=0.015) and between the control and /relaxation groups (*p*=0.012).

There were no differences with-in any of the groups in HR and NT-proBNP, Figure VII and VIII.



HR; heart rate. Mean, SD.

Figure VII. Heart rate with-in groups over time. Mean in heart rate between MediYoga, relaxation and control group after 12 weeks.



NT-proBNP; N-terminal Prohormone Brain Natriuetic Peptide, ng/ml; nanogram per millimetre. Mean, SD**.**

Figure VIII. NT-proBNP with-in groups over time. Mean in NT-proBNP between MediYoga, relaxation and control group after 12 weeks.

PAPER III

The participants in this study were those performing MediYoga in **Paper II** and comprise seven men and five women with an age range of 49 to 82 years (median; 63.5 years). Characteristics are shown in Table XII.

Table XII. Characteristics of participants

Gender	Age	Hypertension	Stroke	MI*	CH_2DS_2-VASc Score (0-10)	Number of yoga sessions at hospital	Number of yoga sessions at home
Male	50	-	-	-	0	7	35
Female	66	-	-	-	2	10	48
Male	49	-	-	-	0	10	24
Female	62	X	-	-	2	9	2
Male	68	-	-	-	1	10	0
Male	77	X	-	-	2	9	10
Female	71	X	-	-	3	7	60
Male	61	-	-	-	0	9	36
Female	82	X	-	-	3	11	0
Male	52	X	-	-	1	9	12
Male	65	X	-	-	0	9	0
Female	54	-	-	-	2	10	12

*MI=Myocardial Infarction.

Three categories were identified that describe the patients´ perceptions and experiences of MediYoga: **'*A time for a sense of existence and presence*`, '*A way of gaining well-being and increased consciousness*' and '*Access to a tool to gain willpower and relieve symptoms*'.**

The category **'*A time for a sense of existence and presence*`** was described by patients as increased thoughtfulness and experiences of gaining access to their inner self. Moreover, the patients reported feelings of inner-peace, inspiration as well as expressions of transferring themselves to a deeper level in their minds, after taking part in yoga sessions. Patients also described a sense of presence, and, in this context, a feeling of being more profound and being in the moment. Some sensations were reported as being difficult to explain but were referred to as a higher level of presence and a state in which they wished to remain.

"*….then I was in my own world ..." then you don't worry about anything else really, you just are…//…you didn´t want to let go of the feeling…//…more unaffected by the surroundings….and you were more present…..//*

*The category, '**A way of gaining well-being and increased consciousness**'* was described in two sub-categories: *'experience of an increased well-being'* and *' increased awareness of the connection between physical and mental functions'.* Patients described feelings of enhanced well-being and relaxation after MediYoga. They described it as a feeling of comfort, with components of mental and physical well-being. The patients also perceived that they achieved an enhanced connection with their breathing and anatomy. They reported being able to improve their bodily functions and described an increased consciousness as to how to affect their body.

"*//…..I felt a total relaxation in body and mind….//….You feel more alert when you come out of the session ... you feel peaceful and you feel it ... lighter in body…..//*"

"*//…The physical part greatly affects the mental component……. Increased awareness of the importance of doing this and that I can influence it. ... //* "

The category, ***'Access to a tool to gain willpower and relieve symptoms'*** describes two subcategories: '*an accessible tool*' and '*reduction of bodily symptoms*'. The patients experienced that they had obtained access to a tool for handling emotions, such as fear and anxiety, that they struggled with between and, also during, their episodes of atrial fibrillation. Patients also reported a reduced duration and frequency of heart symptoms. They experienced a substantial effect regarding symptoms of palpitations and were able to revoke the symptom of irregular heartbeat.

" *I still have my irregular heartbeats then, but I feel I handle it better, I'm not as afraid ...//...I do not have them as often and I think I can handle myself and them better."*

"*I felt clearly that there's a connection, at least indirectly, that you can influence how stressed you are through yoga and that it can affect the atrial fibrillation and frequency ... I have actually been free of symptoms in principle the past three months."*

PAPER IV

Thirty-three completed the intervention and were then analysed (assessments) in **Paper I**, 17 women (52%) and 16 men (48%). In **Paper II**, the number of patients was 38, women 20 (53%) and men 18 (47%), respectively. The average age for women was 66±8 and for men 62±9. Women had more hypertension, 23 (62 %), than men, 14 (41%), but no significant difference was observed. Clinical characteristics are shown in Table XIII.

Table XIII. Clinical characteristics

	Women ***n*=37**	**Men** ***n*=34**
Age	66±8	62±9
Hypertension	23 (62)	14 (41)
Heart Failure	0 (0)	0 (0)
MI	0 (0)	0 (0)
Stroke	1 (3)	2 (6)
Beta blockers	27 (73)	23 (68)
Calcium antagonists	9 (24)	8 (24)
Antiarrhythmics drugs	14 (38)	13 (38)
Warfarin	17 (46)	12 (35)
DOAC (direct oral anticoagulants)	1 (3)	8 (24)
ASA (aspirin)	5 (14)	8 (24)
Digoxin	1 (3)	1 (3)
ACE inhibitor	12 (32)	10 (29)

Values are mean (SD), n (%). MI; myocardial infarction. ACE; angiotensin-converting-enzyme.

Health-related quality of life

The results showed no differences between the women's group (WG) and the men's group (MG) at baseline or at the end of study. However, with-in the WG improvements were observed in subscales VT (p=0.008), SF (p=0.040), MH (p=0.006) and the domain MCS (p=0.026). Also, there were improvements with-in the MG in subscales RP (p=0.045), BP (p=0.007), GH (p=0.002), VT (p=0.015), SF (p=0.002), RE (p=0.013) and the domain MCS (p=0.009). No improvement was seen in PCS in either of the groups, Table XIV.

Table XIV. Changes in SF-36 over time

Type of score SF-36	WG *n*=37 Baseline	WG *n*=37 End of study	MG *n*=34 Baseline	MG *n*=34 End of study	Within WG End of study *p*-value	Within MG End of study *p*-value	Between Groups End of study *p*-value
PF	80±20	80±14	82±17	88±15	0.796	0.066	0.252
RP	60±42	65±41	59±42	75±34	0.608	0.045*	0.347
BP	74±26	78±23	67±28	82±23	0.349	0.007*	0.136
GH	61±22	67±18	59±20	71±21	0.094	0.002*	0.254
VT	51±19	61±16	55±15	65±17	0.008*	0.015*	0.978
SF	71±29	82±20	71±26	87±20	0.040*	0.002*	0.552
RE	61±45	77±38	61±42	80±31	0.091	0.013*	0.714
MH	64±16	72±10	64±15	70±15	0.006*	0.081	0.685
PCS	47±10	48±9	47±9	48±9	0.221	0.128	0.955
MCS	40±9	43±9	40±10	43±10	0.026*	0.009*	0.981

Values are mean and SD.* Statistically significant with a p-value < 0.05. WG; women group, MG; men group. Dimensions of SF-36; PF; physical functioning, RP; role-physical, BP; bodily pain, GH; general health, VT; vitality, SF; social functioning, RE; role-emotional, MH; mental health. Domains of SF-36; PCS; Physical Components Summary, MCS; Mental Components Summary

Hemodynamic assessments

Between the groups there were no differences in SBP, DBP as well as HR at baseline or at the end of study. Within the WG there were improvements in SBP (p= 0.010) and DBP (p<0.001), but no difference was seen in HR (p=0.261) at the end of study. There was also improvement within the MG in DBP (p=0.021) at end of study, but no differences were seen in SBP (p=0.057) or HR (p=0.869), Table XV.

Table XV. Changes in systolic, diastolic blood pressure and heart rate over time

	WG *n*=37 Baseline	WG *n*=37 End of study	MG *n*=34 Baseline	MG *n*=34 End of study	With-in WG End of study *p*-value	With-in MG End of study *p*-value	Between groups End of study *p*-value
SBP,mmHg	138±19	129±17	133±14	129±13	0.010*	0.057	0.253
DBP,mmHg	82±10	75±11	80±9	76±9	<0.001*	0.021*	0.092
HR/minute	63±11	60±12	63±18	62±16	0.261	0.869	0.560

Values are mean and SD. * Statistically significant with a p-value < 0.05. WG; women group, MG; men group, mmHg; millimetre of mercury, SBP; systolic blood pressure, DBP; diastolic blood pressure, HR; heart rate.

DISCUSSION

Our main findings were that MediYoga improved HRQoL among patients with PAF, especially their mental health. Moreover, systolic blood pressure decreased after performing MediYoga. No gender differences were found regarding the effects of performing MediYoga. However, both men and women improved their mental health as well as diastolic blood pressure. The patients also described how they had been provided with a tool, in MediYoga, to handle emotions as well as symptoms. They also experienced a decrease in palpitations.

There is substantial evidence from the literature that many patients with AF experience reduced HRQoL (57, 58, 153, 154) regarding both physical and mental health. Interventional (such as ablation) (155) and medical treatments (such as rhythm/rate regulation) may improve HRQoL (155, 156), but, yet, there are adverse events and side effects of these treatments which afflict the patients. Thus, there is room for introducing self-management programs for patients with AF as an additional treatment.

We have shown that patients with PAF, Papers I-II as well as Paper IV, improved their mental health (MCS, SF-36) after performing MediYoga. There was also an improvement in bodily pain, Paper II, which may be related to the movements in the MediYoga program that contribute to enhancing bodily functions. Improvements in bodily functions were also described in Paper III. This is in accord with the literature indicating that improved mental health may have a positive impact on physical health (53). Moreover, the social life of patients with PAF may have deteriorated (59). The results of our study, with increased social function (SF) may indicate improvement in their social situation.

We did not find any differences between the three groups (MediYoga, control and relaxation group) in Paper II regarding the two HRQoL questionnaires (SF-36 and ASTA). However, close scrutiny of the changes in the sub-scales of SF-36, over time in the different groups, reveals that all sub-scales increased in the MediYoga group. In addition, the sub-scales showed no change, some slight increase or a trend to decrease in the control- and the relaxation groups. However, this is a small study and the changes may be different in a larger population.

Moreover, the questionnaire ASTA measures symptoms related to HRQoL, which in Paper II showed no change in the MediYoga group. In contrast, the patients in Paper III reported a reduction in their palpitation symptoms. Also, the sub-scales in ASTA showed greater improvement in the control group, and to some extent in the relaxation group. There was no improvement in the MediYoga group. A close examination of the estimated scores revealed that the MediYoga group may have lower symptom-related HRQoL scores, in ASTA, than the other groups (the lower estimated scores in ASTA indicates better HRQoL). This shows that the MediYoga patients experienced less symptoms than the other two groups. Although one of the inclusion criteria was “symptomatic PAF”, the number of symptomatic episodes can

differ at baseline in the groups. This may explain why the MediYoga group had less symptoms at baseline and that there were no changes over time. The changes in the control group may differ because of receiving new medication, with reduction in symptoms, as well as the knowledge of being able to participate in MediYoga sessions after the study.

The results from Papers I-II and IV are in accordance with the literature, where patients with PAF report a lower HRQoL than the normal population, in Sweden, and to the same degree or worse as other chronic heart conditions (57). There were no gender differences in HRQoL at the end of the study, in Paper IV, but mental health outcome improved within both groups. Previous studies have found that women with AF report an overall lower HRQoL than men (38, 157). This is not with the case in our study, where both genders rated their mental health as low at baseline. Our findings also differ from those of Paquette et al. (57). In the latter study women more often had lower physical scores than men whereas we found high physical scores in both genders. In addition, both women and men had lower mental health outcomes than physical outcomes compared to Paquette et al. It may be that the patients in our study, both genders, had more symptomatic AF, which affected their mental health. In addition, men experienced the same symptoms as women and this may indicate that both genders require a complementary treatment, as a part of a self-management.

Hypertension is a risk factor in the incidence of both AF and the recurrence of AF (6-8). Our results in Papers I-II and IV show that systolic and diastolic blood pressure decreased after performing MediYoga. This is in agreement with other studies using yoga, which have evaluated blood pressure (158-161). The heart rate decreased after performing MediYoga in Paper I, but not in Papers II and IV. Other studies have found that performing yoga decreases heart rate (108, 110). As we included only patients with symptomatic PAF in Paper II, the defaulted reduction in heart rate in Papers II and IV may be explained by the burden of episodic AF; the heart rate may have been higher in Papers II and IV than in Paper I. Medical treatment for patients with AF has evolved and improved over the last years. Patients may have been better stabilized by medical treatments in Papers II and IV than in Paper I. There is also a diversity of age among the participants in Papers I-II in comparison to the median age of AF (1). Our participants are younger, which is reflected in that many of them were still working and perhaps more affected by the AF episodes.

There was no improvement in NT-proBNP within or between any of the groups in Paper II, which may be related to the fact that NT-proBNP may only change to a limited degree over a three-month period. Cardiac biomarkers, such as NT-proBNP are also associated with the amount of episodes of AF (162). A recent study describes a normal value of NT-proBNP as 125 ng/L (163). In our study, the values of NT-proBNP were from 175 to 285 ng/L which suggesting that the patients in all groups had episodes of AF; this was however, not further evaluated .

Patients with PAF seeks complementary therapies in the approach for example to self-manage symptoms as a self-care (95). In this context, a few studies have been

evaluating complementary therapies to manage symptoms and increase HRQoL. One study found that yoga may reduce episodes of AF as well as decrease anxiety and depression (109). This is an important finding though depression is connected to the incidence of AF (23). Similarly, a brief cognitive behavioural therapy program showed improved results in HRQoL among patients with PAF (69). However, the latter study evaluated patients together with their spouses, and the program must be conducted with educated instructors at specified sites. This may exclude single patients and also deprive them of the freedom to use a program whenever and wherever desired. Our studies suggest a program which, after short instruction, may be performed independent of instructors or spouses. It has also been described by patients, in Paper III, as easy to carry out. It can also be used in different venues.

In Paper III, the patients reported that MediYoga supported them in handling emotions, such as anxiety and worry, as well as in reducing symptoms, which in this context may be related to improved mental health. So far, studies have evaluated patients' concerns about living with AF (59, 61, 67, 164-166). These concerns include a lack of information about the disease and symptoms, knowledge about medications as well as how to manage symptoms and emotions. Guidelines have been developed as to how to support patients with AF in medical care (167). Moreover, the literature concludes that managing the risk of developing AF or reducing the risk of cardiovascular events requires tailoring the management of the modifiable risk factors associated with AF (36). Also, structured care and nurse-led strategies have shown improvements in the management of patients with AF (70, 168). Even if the literature suggests that there is a need for interventions and practical tools, such as self-management, that assist patients in managing their emotions in/or between episodes of AF, (67, 68) none of the above guidelines and strategies include self-management programs. Health care is going in a direction whereas nurse allied and caring science recommends an individual holistic approach (46, 47) when caring for patients, thus, to improve patients´ outcome as well as improve their QoL. In relation to patients with PAF and existing healthcare treatments, thus, is far from responding to the individual desires, needs as well as how they can manage their illness. It is therefore important to provide support and assistance to this population in their health process. Thus, in this context of an extended self-management programs which support the patients with tools to manage their symptoms.

Our results, in Paper III, show that MediYoga provided patients with a tool enabling them to reduce their fear and better cope with emotions elicited by symptoms. Patients also reported attaining an increased awareness of bodily functions and the ability to influence them. As the definition of self-management includes, "the ability to manage symptoms and life-style behaviours" we suggest that MediYoga may play an important role in this context.

METHODOLOGICAL CONSIDERATIONS

The literature indicates the importance of including a disease-specific questionnaire when measuring HRQoL (50). At the start of study I (paper I), we found disease-specific questionnaires, involving AF, in English but not in Swedish. When planning study II (paper II), we found a new validated disease-specific questionnaire, ASTA, which was included, as a complement to SF-36, which includes symptom-related outcomes.

In Paper I we included patients with a diagnosis of PAF whereas in Paper II we added *symptomatic* PAF as an inclusion criterion. PAF symptoms affect HRQoL, and to strengthen the evaluation of HRQoL over time it seemed more appropriate to include only patients with *symptomatic* PAF. Episodes of AF have not been monitored in Papers I and II. Thus, we cannot make any statements as to whether MediYoga had any effects on AF recurrence. In Papers I and II there is a discrepancy in the number of screened patients. This can be partly explained by the addition of symptomatic PAF as an inclusion criterion, and diabetes mellitus and untreated hyperthyroidism as exclusion criteria in Paper II.

Group sessions with patients suffering from the same condition may increase participants' HRQoL (169). In order to avoid this effect, we conducted a study with three-arms, i.e. yoga/relaxation/control, in Paper II. To our knowledge there is only one other study using yoga and evaluating HRQoL among patients with PAF. The current thesis may serve to strengthen the evidence of the positive impact of yoga on HRQoL.

In this thesis, we used a yoga form, MediYoga that is performed with calm movements. It can be conducted sitting in a chair, lying or sitting on a blanket and can be used in different venues. Because of its simplicity, persons of all ages and with different diseases are able to perform this form of yoga. It is also easily implemented in clinical settings and, in addition, the patients can perform the yoga program by themselves after training. The amount of time spent performing yoga in group sessions was based on recommendations from the literature and the Kaivalyadhama Centre, India, which the author visited for research purposes. The reason to select relaxation with music is that music therapy seems to have positive effects in HRQoL, blood pressure and heart rate (98, 99) . Also, the program could be conducted in the same environment as the yoga sessions, indifferent times. The amount of time in the group sessions, 30 minutes, are described to be sufficient (170). Thus, we tried to separate the effects of yoga from other methods with a similar effect.

In Paper III, we included 12 patients to provide in-depth material and contribute to trustworthiness. The interviews were conducted between 2015 and 2017, a long period in this context. Paper II's study was in progress during this time. The outcome may have been different if the time-span had been shorter. However, we achieved a sufficient level of information power. As the principal author lacked experience in the

field of research interviews, the other two authors, with experience, also conducted interviews (three each). The interviews were transcribed verbatim and then checked by the principal author. To ensure confirmability the texts were then analysed and discussed several times by all the authors. In accord with the description given by Graneheim, Lindgren and Lundman (151), using a manifest approach, the data were identified in terms of categories. The literature recommends that interviews should take place a short time after an intervention, to ensure that the information is fresh (150). In Paper III, we interviewed the participants within four weeks of the final visit in the randomized study, Paper II. We discussed using a different approach, such as phenomenological, but the latter is a descriptive method in which the participants describe the occurrence of a phenomenon in the context of their life-world. This were not our purpose. Our intention was to describe how yoga affected the participants and how they experienced performing yoga. We concluded that semi-structured interviews and content analysis would be the most appropriate methods in this context.

CONCLUSIONS

• MediYoga improved HRQoL parameters, especially mental health, and decreased blood pressure among patients with symptomatic PAF. MediYoga may be adopted as a part of self-management program, combined with standard treatment, to reduce symptoms, such as anxiety and worry.

• Experiences and perceptions of MediYoga described decreased symptoms and MediYoga was perceived as an accessible tool to manage emotions related to episodes of AF. MediYoga integrates physical, mental and spiritual components, which may assist in achieving a holistic approach. Using MediYoga as a self-management program may help patients manage their situation, which may lead to an improvement in HRQoL.

• No gender differences were observed. However, MediYoga appears to improve mental health in both men and women.

• An improved mental health may help to achieve improved physical health and therefore an overall improved balance in life. With this knowledge we suggest that MediYoga may be a part of a self-management program for patients with PAF.

CLINICAL IMPLICATIONS

To be provided with a tool to handle symptoms and emotions, which occur during or between the episodes of AF, may contribute to an increased knowledge about self-care and self-management and therefore an improved feeling of security.

Improved mental health and reduced blood pressure among patients with paroxysmal atrial fibrillation, after performing MediYoga, may improve their social situation.

The MediYoga program is suitable for patients with PAF as it involves movements, deep breathing and meditation, possible regardless of age. We believe that this yoga form can be implemented in health care due to its simplicity and be performed generally amongst the PAF population.

MediYoga, as a self-management program, may be a complementary therapy for patients with symptomatic PAF.

LIMITATIONS AND FUTURE PERSPECTIVES

These data have limitations due to a short follow-up and no evaluation of whether MediYoga affects the number of symptomatic AF episodes. A longer follow-up is therefore warranted to see if the positive effects on HRQoL are maintained. Heart rhythm monitoring should be performed to see if MediYoga reduces the number of AF attacks. Further, an evaluation of hospitalization and health care costs are necessary to assess the cost effectiveness of MediYoga.

Our results show that the MediYoga resulted in improved social functioning. This is an interesting finding and may be further evaluated to see if these improvements are maintained.

Although these data suggest that MediYoga improved mental health in PAF patients, larger randomized studies are warranted to compare MediYoga with other life-style interventions, for example, cognitive behavioural therapies, known to increase HRQoL.

SVENSK SAMMANFATTNING

INLEDNING

Förmaksflimmer (FF) är den vanligaste hjärtarytmin i den vuxna befolkningen. Utöver ålder och kön är högt blodtryck den viktigaste riskfaktorn för insjuknande av FF. Flera biomarkörer inklusive NT-proBNP och Troponin har visat sig vara relaterat till FF. Symtom förekommer ofta i form av hjärtklappning, tryck över bröstet, andfåddhet, yrsel, ångest och oro. Standardbehandlingen för FF är symtomlindring och består av rytm- och frekvensreglerande läkemedel, elkonventering samt ablation. Alternativa metoder bör tillföras, som till exempel förändringar av livsstilsfaktorer. Skillnader mellan könen som har FF är bland annat att kvinnor är äldre och har mer hypertoni samt hjärtsvikt.

FF är associerad med nedsatt hälsorelaterad livskvalité. Symtom från episoder av FF kan påverka sociala situationer och arbetsrutiner och det förekommer ofta känslor av ångest och depression. I avseende av könsskillnader har studier visat att kvinnor skattar sämre livskvalité än män.

Patienter med FF söker komplementära behandlingar för att kunna minska sina symtom och öka sin livskvalité. Yoga kan ses som en av dessa komplementära behandlingar och beskrivs att balansera det parasympatiska och sympatiska nervsystemet, sänka blodtryck, hjärtfrekvens samt NT-proBNP. Yoga har också visat sig ha effekt på upplevelser av stress och HRQoL.

Litteraturen beskriver olika ”self-management program” som består av utbildning, symtom monitorering, medicinsk följsamhet, livsstil etc. Dessa program skräddarsys, utvärderas och genomförs till vad som behövs för att leva med och hantera sjukdomen.

Det övergripande målet inom omvårdnad och vårdvetenskap är att stödja och stärka patienternas hälsa och processer med tanke på hälsa, sjukdom och lidande. I denna process är det viktigt att det behandlas utifrån patientens uppfattning hur sjukdomen påverkar deras upplevelse av mening och sammanhang.

Det övergripande syftet med denna avhandling var att studera effekter, upplevelser samt erfarenheter av MediYoga hos patienter med paroxysmalt förmaksflimmer samt att studera könsskillnader.

METOD OCH RESULTAT

Studie I: Detta är en randomiserad kontrollerad pilotstudie med 80 patienter som randomiserades till yogagrupp, *n*=40, eller kontrollgrupp, *n*=40 på Universitetssjukhus, Stockholm, Sverige. MediYoga gruppen utförde yoga en timme/vecka i 12 veckor. Hälsorelaterat livskvalitéfrågeformulär (SF-36, EQ - 5D visuell analog skala), blodtryck och hjärtfrekvens mättes vid studiestart och vid studiens slut. Resultaten visar att hälsorelaterad livskvalité förbättrades i yogagruppen och blodtryck samt hjärtfrekvens sjönk i jämförelse med kontrollgruppen.

Studie II: I denna studie med stratifiering av kön, randomiserades 132 patienter, med symtomatisk PAF, till MediYoga grupp (*n* = 44), avkoppling (*n* = 44) och kontrollgrupp (*n* = 44). MediYoga gruppen utförde yoga en timme/vecka i 12 veckor. Hälsorelaterad livskvalité (SF-36, ASTA), blodtryck, hjärtfrekvens samt NT-proBNP mättes vid studiestart och i slutet av studien. Resultaten visade inga skillnader i ASTA och SF-36 mellan grupperna. Dock förbättrades hälsorelaterad livskvalité, SF-36, inom MediYoga gruppen. Både systoliskt och diastoliskt blodtryck minskade i gruppen som utförde MediYoga jämfört med kontrollgruppen, men det var ingen skillnad jämfört med avkopplingsgruppen. Det fanns inga skillnader i hjärtfrekvens och NT-proBNP mellan eller inom grupperna efter 12 veckor.

Studie III: Detta är en studie med en kvalitativ design som genomfördes med individuella semistrukturerade intervjuer. Studien genomfördes med 12 deltagare (7 män och 5 kvinnor, medelålder 63,5) som hade deltagit i MediYoga gruppen i studie II. Data analyserades med kvalitativ innehållsanalys med en induktiv metod och ett manifest förhållningssätt. Tre kategorier identifierades i analysen; ”En tid för en känsla av existens och närvaro”, ”Ett sätt att få välbefinnande och ökad medvetenhet” och ”Tillgång till ett verktyg för att få viljestyrka och lindra symtom”

Studie IV: Detta är en studie med en jämförande design mellan könen som hade utfört MediYoga. I denna studie analyserades enbart data från yogagrupperna (kvinnor *n* = 37, män *n* = 34). Data (dvs. hälsorelaterad livskvalité [SF-36], blodtryck och hjärtfrekvens) samlades vid studiestart och studiens slut. Det fanns inga skillnader mellan gruppen kvinnor eller män i SF-36 vid slutet av studien, emellertid, fanns förbättring med i gruppen kvinnor i subskalorna vitalitet, social funktion, psykisk hälsa och i domänen mental komponent. Hos män förbättrades subskalorna roll-fysisk, kroppslig smärta, allmän hälsa, vitalitet, social funktion, roll-känsla och domän mental komponent (SF-36). Det fanns inga skillnader mellan grupperna i systoliskt och diastoliskt blodtryck samt hjärtfrekvens i slutet av studien. Inom kvinnogruppen observerades skillnader i systoliskt och diastoliskt blodtryck, men ingen skillnad sågs i hjärtfrekvens. Inom gruppen med män förbättrades diastoliskt blodtryck men inga skillnader sågs i systoliskt blodtryck eller hjärtfrekvens.

SLUTSATS

MediYoga förbättrar HRQoL samt blodtryck bland patienter med PAF. Dessutom har både kvinnor och män fördelar med att utföra MediYoga. Patienter beskriver också att MediYoga är ett tillgängligt verktyg att hantera känslor och symtom. MediYoga kan vara en del av ett ”self-management” program, som ett komplement till standardbehandling, hos patienter med PAF.

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I am willing to admit it has been a long journey with high mountains to climb, but, as well many slopes to glide. Journeys are for curiosity, experiences, perceptions, discovery and learning and so have also this journey turned out to be.

However, to have a distinguished journey you need some excellent travelling companions….

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Supplement I.

Mediyoga program

The program started with the patients lying on their back or sitting in a chair and taking long deep breaths in through the nose. This was performed for 11 minutes. Then followed **Movement One for three minutes**: back flex, in which the patients sat cross-legged or in a chair. Their backs were straight, their hands on their outer ankles if on the floor, and on their kneecaps when sitting in a chair. The movement was performed by pushing the hips forward so that the body was arched. The shoulders were left behind so that the chest could open. Then the hip and pelvis rolled backward so that the spine curved. The chin was kept still. Deep breathes were taken during the movement, in when rolled forward/up and out when rolled backward**. Rest for one minute.**

Movement Two lasted 3-11 minutes: The patients sat with their legs under them, or on their heels if sitting in a chair. Their back was straight, the chin slightly retracted and hands interlocked. Arms were stretched above the head and the elbows locked. Deep breathing was carried out during the session followed by a one-minute rest. **Movement Three** was a mantra meditation. Sitting cross-legged, or in a chair, with the left hand on the breastbone, right hand over left. Relaxed in the shoulders, elbows and jaws with closed eyes, focusing on the heart and listening to, or singing along with, a yogi mantra for the heart, which was playing in the background. Those three movements were interspersed with the following movements:

1. Back Twist for three minutes. Hands up on the shoulders, fingers, and thumbs back. Elbows out to the sides up to shoulder height. The chin slightly indented. During inhalation, the upper body was turned to the left. During exhalation, the body was turned to the right. The chin was constantly in line with the breastbone and this was followed by resting for one minute.

2. Back Bending for three minutes. Hands on the shoulders, as in Movement 1. While inhaling, the upper body was bent down on the left side toward the floor. At the same time an attempt was made to point the right elbow up toward the ceiling. During exhalation, the movement was in the other direction down to the right. Resting for one minute.

3. Neck Rolling for approximately two minutes. Sitting with a straight back, the jaw was relaxed, letting the chin fall to the chest. The chin was moved slowly clockwise in a large circle. One whole circle took about 10 seconds. After 10-15 laps the direction changed and 10-15 laps were performed in the other direction. The head was then slowly straightened up and a rest was taken.

The program was ended with 5-10 minutes of relaxation.

Supplement II.

YOGA PROGRAM MYPAF

DEEP BREATHING

Sit on a chair or lie on your stomach or a thick blanket. Take deep long breaths through your nose. Inhale all the way up to the clavicles through expanding the stomach, lungs and chest. Exhale and feel your stomach and chest drop again. The expiration is passive, and the inhalation is active. Rest between ex- and inhalation.

SUFI CIRCLES

Adopt an easy meditation position and clasp your knees. Clockwise in a circular motion rotate your abdomen, pelvis and hips. Strive to keep your head centred in the middle. Change direction after 1 to 3 min and rotate counter-clockwise for an additional 1-3 min. Long deep breaths throughout the exercise and rest seated after the exercise.

TOWARDS BEND

Sit with legs outstretched in front of you and lean your torso straight up toward your knees. Stay as deep you can, in this position, and take long deep breaths. Relax your neck and after 1-3 minutes come up gently and rest sitting.

BUTTERFLY

Sit in an easy meditation position and position the soles of your feet against each other. Grab your feet, with your hands, and pull your heels toward your body. With a straight back start to rock your knees up and down. Try to come down as close to the floor as possible with your knees. Long deep breathes for 1-3 minutes. Rest.

HIP LIFT

Lie on your back and put the soles of your feet on the floor whilst pulling your heels as close as possible to your buttocks. Take hold of your ankles, push up with your hips and abdomen as high as you can towards the ceiling while inhaling. Breathe out with your buttocks down on the floor again.

CAT and COW

Standing on all fours with feet together and a hip width between your knees. Shoulders should be a palm width apart. Hollow down your back, lift your head as high as you can and breathe in at the same time. Exhale, pull your chin toward your chest and push back up towards the ceiling. Up and down this way for 1-3 minutes.

BABY POSE

Resting in a baby pose for two minutes. Strive to bring your buttocks down against your heels and your forehead on the floor. Long deep breaths.

NECK ROLLING

Sit in easy meditation position. Lower your chin towards your chest with a straight back and stretched neck. Slowly pull your chin along the right collarbone up to the right shoulder and, from there, the chin up through the air down to the left shoulder, down along the left collarbone, back to the starting point and continue in the same direction. Breathe out through your nose when your chin rolls down over your chest and breathe in through your nose when your head is moving backward. Relax your shoulders and jaw and let your chin drop. Change direction after 10-15 turns clockwise and make 10-15 equally slow turns back the other way. A lap should take about 10 seconds there should not be any pain in your neck.

STRETCH

Allow yourself to rest and relax for a while. Stop taking deep breaths and allow yourself to breathe naturally. Stretch gently and place the left foot on the right knee, pull your knee down toward the right while you rotate your upper body to the left. Stretch and switch side i.e., the right foot on the left knee for a minute.

MEDITATION

Sit in an easy meditation position (on a chair). With a straight back and stretched neck, close your eyes and place the focus on the 3rd eye. Your hands rest gently against your knees or thighs. Repeat the following mantra: according to instructions of SA-TA-NA-MA for 11 minutes. Forefinger to thumb presses against each other when saying SA. Then press thumb and the middle finger on TA. On NA press you thumb to ring finger top. On MA press your thumb to little finger tip. Repeat this for 11 minutes.

Supplement III.

Question - guide and follow-up questions

What were your thoughts about yoga before you began this project?

Negative expectations?
Positive expectations?
Ambivalent perceptions/experiences about yoga?

Tell us about a yoga session you were in!

Can you describe what happened?
Positive effects? Physically, mentally.
Negative effects? Physically, mentally.
Can you describe the experience?
Why do you think you experienced this?

Was there a moment in the yoga sessions that you experienced in any special way?

How did you experience yourself before the yoga session?

How did you experience yourself after the yoga session?

What are your views on yoga now?

Summarize your experience of yoga.